

**Tax and Economic Behaviour
Online Experiment**

Impact of Tax Salience on Economic Behaviour

EC.438 Experimental Economics
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ABSTRACT

The tax and tax salience are found to be impactful on consumer behaviour by many researchers. In the literature, there are studies analyzing relationships between tax and willingness to pay or investment decisions. In addition to them we checked the effect of higher or lower prices and included the analysis for financial literacy and optimistic financial behaviour. To do this study, we have conducted an experiment which tries to measure the behaviour of participants under visible or invisible tax conditions. Four different hypotheses were analyzed and the results show that,

- 1. Participants tend to pay less when tax is salient. Which is parallel with the literature*
- 2. Relationship between price of products and tax salience is not observed.*
- 3. Financial literacy is found to be effective on tax sensitivity of participants*
- 4. Relationship between optimistic financial behavior and tax sensitivity of participants is observed.*

Keywords: tax, tax salience, investment, experimental economics

Introduction

Benjamin Franklin once said: “In this world nothing can be said to be certain except death and taxes.” (*Strange and unusual taxes throughout history form around the world*, n.d.). It can be assumed that taxes have existed since the existence of a society and a state. Today, many tax systems are characterised by their complexity and lack of transparency, which hinders citizens to take taxes into account when calculating budgets or optimising utility (Chetty, Looney & Kroft, 2009).

Neoclassical theory assumes that people optimise completely in terms of taxes, i.e. act rationally. If a tax on a good increases, this is included in the budget calculation and consequently a smaller amount of this good can be consumed or it is replaced by a substitute. However, new findings show that people do not act optimally with regard to taxes but underreact to them if they are not fully salient. The term tax salience, as known as a fiscal illusion in traditional public finance, is defined as the fact that the behaviour of the taxpayers depends on the presentation of a tax (Chetty, Looney & Kroft, 2009).

In this article, we first want to see how tax salience affects people's consumption habits and their willingness to invest. Consumption and investment have separate utilities for individuals.

We want to examine the effect of tax salience on consumption utility. Tax salience is a relatively new field of economic research, which emphasises that the way in which taxes are displayed can affect how they influence the economy. In particular, it emphasises that people are more likely to change their behaviour in response to highly visible and highly salient taxes (Varela, 2016).

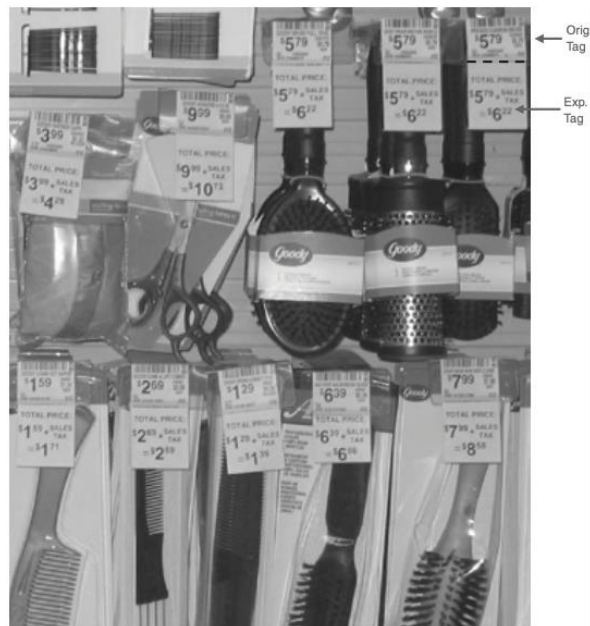
To understand the results of our experiment and article, we will first examine Chetty, Looney, and Kroft's (2009) article on Salience and Taxation: Theory and Evidence. With the study in this article, we will understand how individuals' decisions change when they know how much tax they pay. In particular, their work focuses on an experiment that explains human behavior very well in terms of taxes and salience. Also, in the next section, we'll review Amy Finkelstein's "E-ZTAX: Tax Salience and Tax Rates" research and article. This research will show us how the same individuals change their consumption habits with decreasing tax salience..

Tax salience of taxed goods in a grocery store; Chetty, Looney and Kroft

The authors have investigated the extent to which people actually act rationally and optimally with regard to taxes. To test this, the effect of salience on behavioural responses to consumer demand was examined. The salience of the tax was experimentally constructed as follows: In addition to the price tags showing the "normal" pre-tax prices, price tags indicating the tax-inclusive price were displayed (Chetty, Looney & Kroft, 2009).

As a general rule in American grocery shops, the products are marked with the pre-tax prices (shown in Figure 1) and the tax is only added to the price when paying at the cash register. The sum of a shopping cart can therefore only be calculated on the basis of additional tax considerations. The extent to which consumers take these thoughts into account in their purchases will be examined by the experiment in a grocery shop in a middle-income suburb in Northern California. About 30% of all products in this grocery store are subject to the local tax of 7.375%. For a period of three weeks, goods from three groups (cosmetics, hair care accessories, and deodorants), which are subject to this tax, were fitted with new price tags in addition to the original tags. These new price tags reflect the final price, i.e., price including 7.375% tax (shown in Figure 1). The original price tag has not been removed so as not to give the impression that prices have generally risen (Chetty, Looney & Kroft, 2009).

Figure 1 - Tax-Inclusive Price Tags



Source: Chetty, Looney and Kroft (2009)

A preliminary survey was conducted to check whether the new price tags are effective in increasing tax salience. 49 students were asked to select two items from a survey and note the price they would eventually pay at the checkout. The survey was conducted twice: First, the students were presented with the price tags of the goods with pre-tax prices. In a second step, the students were shown the price tags containing the tax-inclusive prices. The results in Table 1 show that the new price tags do indeed have an effect on the tax bases. Only 18% of students gave approximately the right amount of the sum they would pay at the checkout in the first round, compared to 75% of students in the second round (Chetty, Looney & Kroft, 2009).

Table 1 - Survey evidence on the effect of tax-inclusive price-tags

	Mean	Median	Standard deviation
<i>Panel A. Classroom survey</i>			
Original price tags:			
Correct tax-inclusive price w/in \$0.25	0.18	0.00	0.39
Experimental price tags:			
Correct tax-inclusive price w/in \$0.25	0.75	1.00	0.43
<i>t</i> -test for equality of means: $p < 0.001$			
<i>N</i> = 49			
<i>Panel B. Grocery store survey</i>			
Local sales tax rate	7.48	7.39	0.80
(Actual rate is 7.375 percent)			
Fraction correctly reporting tax status			
All items	0.82	1.00	0.38
Beer	0.90	1.00	0.30
Cigarettes	0.98	1.00	0.15
Cookies	0.65	1.00	0.48
Magazines	0.87	1.00	0.34
Milk	0.82	1.00	0.38
Potatoes	0.81	1.00	0.39
Soda	0.76	1.00	0.43
Toothpaste	0.80	1.00	0.40
<i>N</i> = 91			

Notes: Panel A reports summary statistics for a survey of 49 students who were shown regular (non-tax-inclusive) price tags and the experimental (tax-inclusive) price tags. Statistics shown are for an indicator for whether individual reported total bill within 25 cents of total tax-inclusive price. See Web Appendix Exhibit 1 for survey instrument. Panel B reports summary statistics for a survey of 91 customers at the treatment grocery store. See Web Appendix Exhibit 2 for survey instrument.

Source: Chetty, Looney and Kroft (2009)

In order to test the effect of these new price tags, changes in demand were investigated. The quantities of products sold in the treatment group were compared with quantities sold in two control groups. The treatment group includes all products in the category cosmetics, hair care accessories and deodorants, to which new price tags were applied. The control groups consist for one thing of products placed in the same aisles as the treatment products for which no treatment was applied and for the other thing it includes all products from the three categories sold in comparable shops in the area. A difference-in-differences methodology was used to test whether the sales volume of the treatment group decreased as expected (Chetty, Looney & Kroft, 2009).

The analysis was conducted using scanner data to provide information on prices and quantities sold for the three categories for a period of one year. To test whether there were significant differences in sales between the treatment group and the control group, the means of both

groups were compared. The results in Table 2 show that on average, sales of products from the treatment group decreased by 1.3 units per week, whereas those from the control group increased by 0.84 units in the same period (Chetty, Looney & Kroft, 2009).

Table 2 – Difference-in-differences analysis of mean quantity sold

Period	Control categories	Treated categories	Difference
<i>Panel A. Treatment store</i>			
Baseline (2005:1–2006:6)	26.48 (0.22) [5,510]	25.17 (0.37) [754]	–1.31 (0.43) [6,264]
Experiment (2006:8–2006:10)	27.32 (0.87) [285]	23.87 (1.02) [39]	–3.45 (0.64) [324]
Difference over time	0.84 (0.75) [5,795]	–1.30 (0.92) [793]	$DD_{TS} = -2.14$ (0.68) [6,588]
<i>Panel B. Control stores</i>			
Baseline (2005:1–2006:6)	30.57 (0.24) [11,020]	27.94 (0.30) [1,508]	–2.63 (0.32) [12,528]
Experiment (2006:8–2006:10)	30.76 (0.72) [570]	28.19 (1.06) [78]	–2.57 (1.09) [648]
Difference over time	0.19 (0.64) [11,590]	0.25 (0.92) [1,586]	$DD_{CS} = 0.06$ (0.95) [13,176]
<i>DDD Estimate</i>			–2.20 (0.59) [19,764]

Notes: Each cell shows mean quantity sold per category per week, for various subsets of the sample. Standard errors (clustered by week) in parentheses, number of observations in square brackets. Experimental period spans week 8 in 2006 to week 10 in 2006. Baseline period spans week 1 in 2005 to week 6 in 2006. Lower panel reflects averages across the two control stores.

Source: Chetty, Looney and Kroft (2009)

These results clearly show that people react to salience. It is quite conceivable that people are aware of which products are subject to a tax and how high a tax is, but if the taxes are not visible, they are not included in purchasing decisions, as the findings confirm (Chetty, Looney & Kroft, 2009).

Electronic Toll Collection [ETC]

In "E-ZTAX: Tax Salience and Tax Rates.", Amy Finkelstein used electronic toll collection historical data to examine the effect of salience on consumption., and she examined paid on-

site changes in fee rates associated with ETC adoption and propagation. To do this, Finkelstein studied a new dataset on the history of tolls and ETC setups for 123 paid facilities in the United States. At their locations, Finkelstein also evaluated annual facility-level data on toll traffic, toll revenue, and the share of each paid by electronic toll collection. In the first evaluations, it is revealed that after the adoption of electronic toll collection, toll fees have increased. As a reason we can say that while people use toll roads that we can consider as products, thanks to ETCs, the salience in prices has disappeared. Finkelstein claims that she finds that the elasticity of driving with respect to the toll declines (in absolute value) with the adoption of electronic toll collection, suggesting that ETC may raise the optimal level of the toll. And also, she shows that under ETC, toll-setting behaviour becomes less sensitive to the local election calendar, suggesting that ETC may reduce the political costs of raising tolls. In a fully salient tax system, individuals are aware of actual taxes as they make economic and political decisions. In a less salient tax system, individuals are not aware of the actual tax, but instead have a perception of the tax (Amy Finkelstein, 2009)

As a result of the survey study, it was seen that ETC users were less aware of what they paid compared to cash payments. Table I summarizes the results. In the Massachusetts Turnpike MA] survey, 62% of drivers who paid using ETC answered "I don't know" the question about their best estimate of the toll they paid on the Toll Road that day and did not make an estimate without asking the interviewer, please "just make your best guess"; conversely, only 2% of cash paying drivers had to be guided to make an estimate. In the NYNJ (Port Authority of New York and New Jersey) survey, 38.1% of ETC users reported “do not know” or “refused” when asked how much they paid at the toll in their most recent drive across the Hudson from New Jersey to New York, compared to 20.0% of cash users (Amy Finkelstein,2009).

Amy Finkelstein showed us that ETC users did not reduce their use of toll highways even during periods of price increase when prices are not salient by analyzing past data. In other words, they have become a consumer unresponsive to price increases. These price increases are not confidential information, or a price determined after the product is purchased. So why do people who are expected to be rational and need to reduce their demand as the price increases remain insensitive to this? Amy Finkelstein's proposition for this question is that people are unaware of the price increase and consumers are late in changing their consumption habits because of the decrease in salience due to ETC. In other words, if the prices are not

salient, people care less about what they pay (Holguin-Veras, Jose, Ozbay Kaan, and Allison de Cerrano, 2005).

What we need to deduce from Amy Finkelstein's review is that, as can be seen in the ETC example, although there are few empirical studies on the salience of tax today, we see that consumption habits change and cease to be rational as people's knowledge of price and payment decreases. If we evaluate this situation through the taxation policies of policymakers, we can evaluate the situation in two stages. First, if people are not always faced with and rarely see costs, even if they know about tax rates, they may or may lose their sensitivity to rising taxes and rising wages. In the second stage, policymakers, who know that this sensitivity has decreased, will increase the rate of taxes they collect even more. If the taxes are salience, people will be able to easily see what they are buying and paying and they will shape their consumption habits accordingly, as a result, the amount of tax collected will decrease. As a result, policymakers use the salience to their advantage.

With two examples, it is understood that people make decisions with information that they can access easily and without effort, instead of using every possible information and making the most optimal decision, as the classical economy predicts. People do not behave as an *homo-economicus*. Individuals can be manipulated by the salience of the tax.

In the examples, we see that the consumption habits of individuals are clearly affected and individuals come out of rationality. As classical economists mentioned, individuals do not use all information, on the contrary, information must be brought before their eyes. Along with these examples, we will examine whether tax salience triggers individuals' willingness to invest. As individuals gain knowledge, we will understand whether their desire to act rationally increases. In this context, we will examine the effect of tax salience on consumption and investment with our experience. We wonder whether the visibility of the tax affects the participants' tendency to pay. However, we will also examine whether there is a relationship between the price range of the products and the tax salience. In another phase of our experiment, we will also evaluate whether financial literacy has an impact. Finally, we will examine whether the optimistic financial behavior of the participants is related to their tax sensitivity.

Procedure

The experiment took place online via google forms. Participants were university students who enrolled at various universities in Turkey. The experiment links are shared through universities' WhatsApp groups. The participants were mostly males by 63 percent, females were 18 percent and the other 2 percent didn't want to specify their genders. The form consists of instruction, assessment of financial literacy, and experiment questions. The assessment of financial literacy part questions aimed to help us to understand our participants' financial literacy level.

Our experiment questions have two sections. In the first section, we gave our participants a certain amount of money (117 TL) and told them whether to spend their money or invest it. If they invest they will earn 1.17 times the score of the amount they invested. To spend their money we presented them with five products. In each product, we gave them a range of the product's price and asked how much would they price for the value of the product. If the price that they gave were higher than or equal to the real value of the product (random number in the price range), the purchase would be successful and the participant would earn 1.32 times the score of the real value of the product. The remaining amount that participants did not spend money on would be multiplied by 1.17 and this number would be added to the participant's score. If the participant's offer is lower than the real value of the product, the beginning balance of the participant would be multiplied by 1.17.

In the second section of the experiment questions, in contrast to the first part, there will be a tax on the real value of the product. To be successful at purchasing the product participants should offer a number that has to be higher than the sum of product value and the tax. The tax and the range values for the goods in two treatments were set by considering the equilibrium offers. However, in order to prevent the bias between two sections of the experiment. The values of the second section are multiplied with 1.3 for the second section. While analyzing the results, the values for the second section are normalized.

Theory

In order to establish the main model for the experiment, we make the following definitions first:

l : lower bound of the product's value
u : upper bound of the product's value
p : price of the product (random value between l and u)
δ : offer (offer of the participant for the good)
e : endowment
t : tax amount

We ask participants for their offers for the goods which have value (p) determined by l and u. If the offered amount (δ) is greater than the p, the participant can buy the product by paying p and get the benefit of p*1.32 and the remaining part of her endowment will be her investment. Therefore, we can model the utility as a function of δ as follows.

Without tax:

$$U(\delta | p) = \begin{cases} p * 1,32 + (e - \delta) * 1,17 & \text{if } \delta \geq p \\ e * 1,17 & \text{if } \delta < p \end{cases}$$

where $P(\delta \geq p) = \frac{\delta - l}{U - l}$ which is the probability of $p \geq \delta$

$$EU(\delta | p) = \frac{\delta - l}{U - l} * (E(p) * 1,32 + (e - \delta) * 1,17) + \frac{U - \delta}{U - l} * e * 1,17$$

For participants problems, we should maximize this expected utility for δ:

FOC:

$$\frac{dEU(\delta | p)}{d\delta} = \frac{E(p) * 1,32 + e * 1,17 - 2 * 1,17 * E(p) * 1,32 + (e - \delta) * 1,17 * \delta - l * 1,17 - e * 1,17}{u - l}$$

$$\delta_{NT}^* = \frac{E(p) * 1,32 - l * 1,77}{2 * 1,17}$$

Including tax to our model only differs the probability as follows:

With Tax:

$$P(\delta \geq p) = \frac{\delta - t - l}{u - p}$$

$$\delta_T^* = \frac{E(p) * 1,32 - (l + t) * 1,17}{2 * 1,17}$$

Hypotheses

In this experiment, the participants decide to pay for products. There are two sections of this treatment. Each section has five products which have different price ranges. In this experiment, endowments, returns and products are the same. The only difference between the two sections is the visibility of the tax. In this experiment, our first expectation is that participants tend to pay less when tax is visible. The other expectation is that the participants who are in the high financial literacy group tend to pay for products less than the low financial literacy group when tax is visible. Thirdly, we expect financial literacy should affect tax sensitivity of participants. Finally, we expect there should be a relationship between optimistic financial behavior and tax sensitivity of participants.

- I. H_0 : Participants do not tend to pay less when tax is salient.
 H_1 : Participants tend to pay less when tax is salient.
- II. H_0 : There is not a relationship between price range of products and tax salience.
 H_1 : There is a relationship between price range of products and tax salience.
- III. H_0 : Financial literacy does not affect tax sensitivity of participants.
 H_1 : Financial literacy affects tax sensitivity of participants.
- IV. H_0 : There is not a relationship between optimistic financial behavior and tax sensitivity of participants.
 H_1 : There is a relationship between optimistic financial behavior and tax sensitivity of participants.

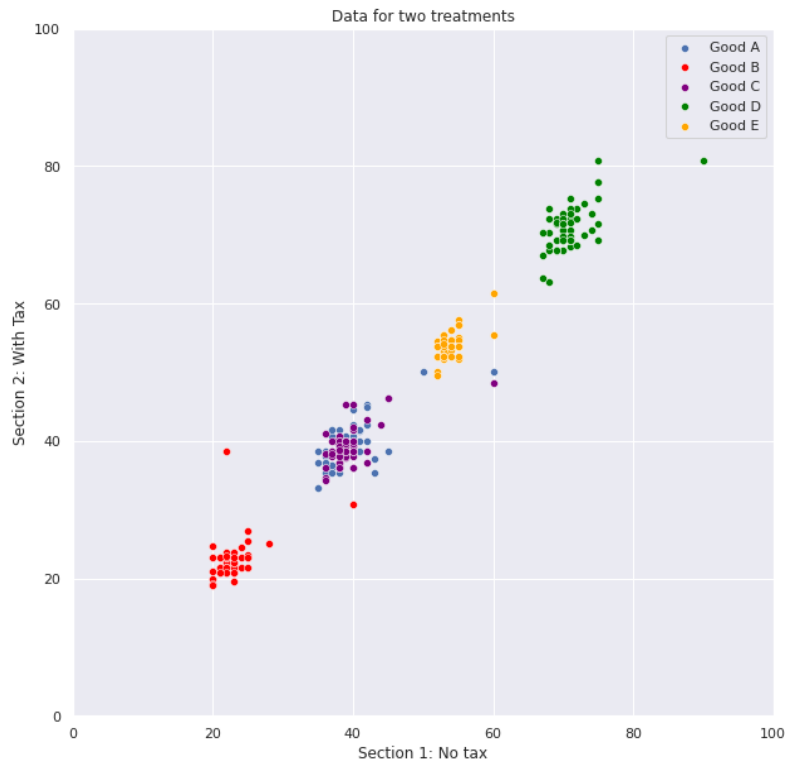
Results

As mentioned in previous parts, our experiment consists of two treatments. At the first section the participants are asked to make a buying or investing decision. For each good, the benefit of the good was its price*1.32 and the price of the good is determined with a uniformly distributed number between a lower and upper bound. If the offered amount by the participant is higher than the price she buys the goods and gets 32 % return also she gets 17 % investment return for her remaining money. If the participant offers less than the price of the good, she cannot buy the good and all of her money is left for investment. At the second section of the experiment the only difference was the tax which is added to the price of the good but was not added to the goods value which actually determines the return from the good.

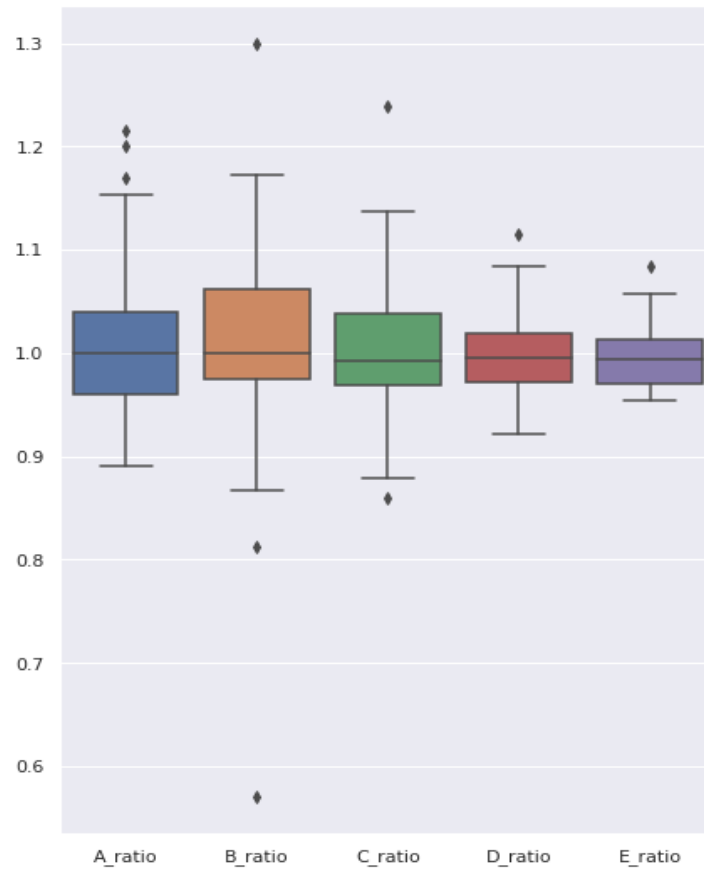
In each section 5 different buying decisions were asked to participants (Good A, B, ... , E) which has different upper and lower bounds for the valuations. The ranges given in the questions is indicated in the following table:

range given in the question	
A	35 - 45 TL
B	20 - 25 TL
C	36 - 42 TL
D	67 - 75 TL
E	52 - 55 TL

In order to test our hypothesis, we should consider the change in behaviour of the participants between two sections of the experiment (With tax & w.o. tax). For a general understanding of the behaviour of participants between two sections of the experiment the following graph might be useful in which all answers (offers for the goods) are shown for each good.



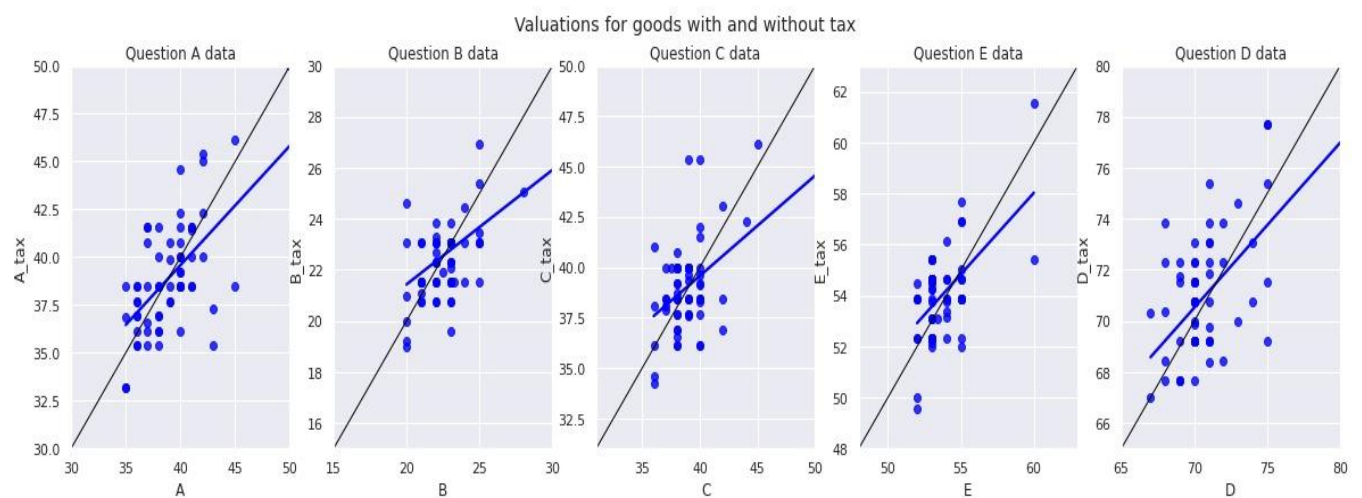
The Nash equilibrium of the game is indicated in the theory section of this report. The experiment is designed to have the same equilibrium between the two treatments for each good. Therefore, the equilibrium for the ratio of offers in treatment 1 and treatment 2 for the same good should be 1. The following box-plot shows that the mean of the ratios of all participants is 1 which is the equilibrium. Moreover, we can observe that the variance of the ratios is decreasing meaning that we can observe the convergence to mean for more participants.



Now we will represent the results for each hypothesis.

Hypothesis 1:

As indicated in the first hypothesis section the participants tend to pay less when tax is salient. In order to observe the tendency, we regress each product in the second section on the same product in the first section.



Then, as can be seen in the table, for all products, coefficients are statistically significant and also we can easily observe that in the chart fitted lines are flatter than the 45 degrees. Therefore, we can reject the null hypothesis and we can say participants tend to give less money for all products.

Hypothesis 2:

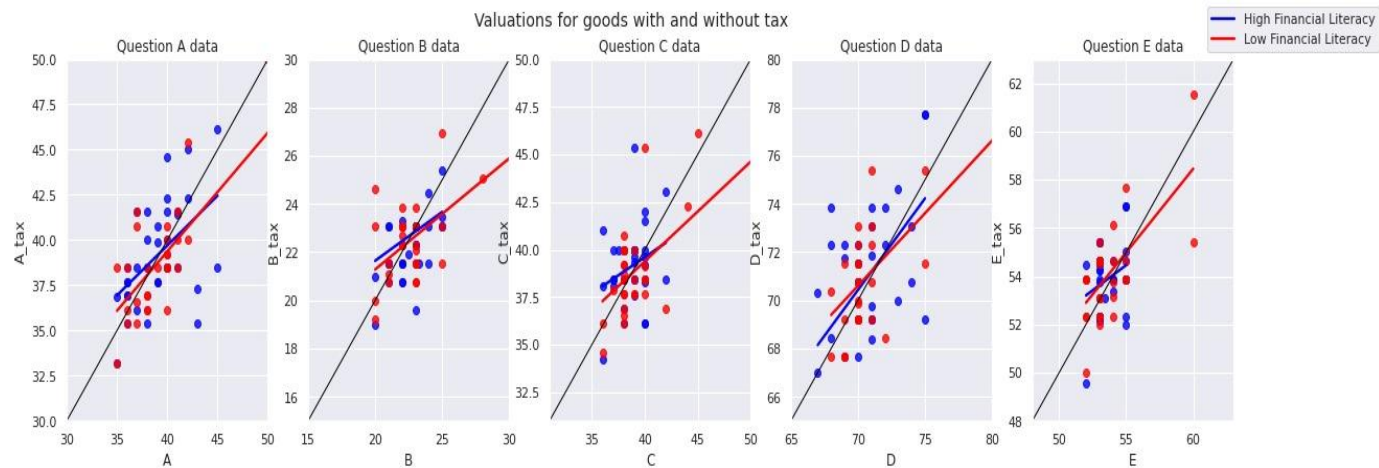
For the second hypothesis section, according to the null hypothesis, there is a relationship between the price range of products and tax salience. In order to observe the relationship, we control statistically significant coefficients of each product that come from regressions in the first hypothesis and sort them by price ranges from lowest to highest.

	coef	std error	p_value	range given in the question
B	0.448647	0.114764	2.349564e-04	20 - 25 TL
A	0.623955	0.078352	5.083501e-11	35 - 45 TL
C	0.497493	0.080521	5.847056e-08	36 - 42 TL
E	0.637398	0.124557	3.331270e-06	52 - 55 TL
D	0.646707	0.097381	9.556882e-09	67 - 75 TL

Then we observe that the coefficients are not constantly increasing or decreasing while the up and down limits of price range are getting higher but this increase. Therefore, we can not reject the null hypothesis. However, this hypothesis should be tested with the difference level price range to get more meaningful results.

Hypothesis 3:

In our experiment, while answers of 34 participants out of 64 participants are higher than 5 on the question "Please rate the level of your financial literacy between 0-10.", 29 participants rated their financial literacy lower than or equal to 5. Then, In order to observe the effect of financial literacy on tax sensitivity, we separate two groups with the names of low (≤ 5) and high (> 5) financial literacy. Then, we regress each product in the second section on the same product in the first section.



As can be seen in the chart, red lines which are the fitted lines of the answers to invisible tax questions are always steeper than the blue lines which are the fitted lines of the answers to visible tax questions. It means that the higher financial literacy group is more sensitive to the visibility of tax. Therefore, we can reject the null hypothesis.

Hypothesis 4:

For the fourth hypothesis, firstly we use the annual real return expectation data to identify optimistic financial behavior of participants and we observe while answers of 40 participants out of 64 participants are lower than or equal to 15 on the question “What is your annual real return expectation?”, 23 participants denoted their annual real return expectation as higher than 15. Then, we separate two groups with the names of optimistic (expected real return > 15) and pessimistic (expected real return ≤ 15) and we regress each product in the second section on the same product in the first section.



Then, as can be seen in the chart, we observe that the red points which represent participants who have pessimistic financial behavior gathered in the lower-left corner, and the blue points which represent participants who have optimistic financial behavior tend to move to the top right corner. Also, we do the same regression to the participants who ranked their financial literacy more than 5. Then, we observe that the results of products A, B, and C are consistent with the initial results but the red and blue points of products D and E seem to be randomly distributed but this distribution does not show a contrary result. Therefore, we can reject the null hypothesis.

Conclusion

In the literature, there are several tax salience experiments that tested our first hypothesis but we also desire to bring new findings to the tax salience literature by testing the relationship between the price range of products and tax salience and asking participants questions about financial literacy and financial optimistic or pessimistic behaviors.

Our first null hypothesis is participants do not tend to pay less when tax is salient. We want to start with this test for being positive about our data since in literature there are several works like Chetty, Looney, and Kroft “Salience and Taxation: Theory and Evidence” on this hypothesis. Therefore, this allowed us to test the reliability of our data and our findings from the first hypothesis are consistent with the Chetty et. all findings. The findings show participants tend to pay less when tax is salient for all treatment products.

For the second hypothesis, although the findings can not reject the null hypothesis “There is not a relationship between the price range of products and tax salience.”, it should be tested with different ranges since the difference between coefficients that come from the highest price range and lowest price range can not be underestimated. When we look at the literature there are some findings like EZ-Tax: Tax Salience and Tax Rates by Amy Finkelstein, and Optimal tax salience by Jacob Goldin about income level and according to these findings, there is not a relationship between income levels and tax salience. That’s why we think that this hypothesis is worthy of improvement.

For the third hypothesis, we desire to test the relationship between financial literacy and tax sensitivity of participants, and our findings show that there is a positive relationship between them. The findings are consistent with our previous expectations. The test is new in the literature and we get meaningful results from this hypothesis.

For the fourth hypothesis, analyzing optimistic or pessimistic financial behavior and tax sensitivity of participants seems to be an interesting area to work. Our findings indicate that the participants showing optimistic economic behaviour are found to be more likely to take higher risks. The results are parallel with our expectations since it is reasonable to expect a parallelism between optimism and risk aversion.

Finally, based on our experience from our results, we can say that; Reducing tax specificity to generate more tax revenue can increase the amount of indirect tax collected. In this way, we see the real-life use of our experience. This salience term, which is seen as a fiscal illusion in the public economy, more accurately explains people's attitudes.

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Appendix

Whole data can be found in the provided link (<https://oguzhanpn.github.io/EC438/>)

Appendix 1 (Required part of the data)

Ekonomik okur yazarlığınızın hangi seviyede olduğunu 0-10 arasında puanlayınız.	Yıllık reel getiri beklentinizi yüzde olarak belirtiniz.	Example question	A	B	C	D	E	A_tax	B_tax	C_tax	D_tax	E_tax
9	7	28	35	19	39	72	53	44	23	49	90	68
10	28	25	37	19	38	69	53	42	23	48	88	68
10	28	24	36	20	39	71	54	43	23	48	88	68
10	10	26	39	20	39	72	53	49	25	52	97	72
2	20	23	34	18	37	69	53	46	25	52	93	70,5
5	10	25	36	21,3	41,8	72	54,2	50	27,7	54,3	96,5	70,5
2	50	27	36	19	37	73	52	50	25	51	95	96
2	20	24	35	18	39	70	52,5	45	23,5	49	89	67,3
5	25	21	33	18	37	68	52	43	23	48	88	68
0	100	21	32,4	17,3	36,4	67,2	51,9	45	23,7	49,6	91,5	70,6
6	20	24	36	19	38,5	70	52,5	44	24	49,5	90	68
7	12	20	33	20	38	68	52	45	23	48	88	69
8	10	24	32	18	37	70	52	40	25	48	90	68
10	4	30	45	25	42	75	55	50	30	50	90	70
4	10	26	37	23	38	70	54	54	30	52	94	71
6	35	22	38	21	40	69	53	52	28	51	94	69
5	20	24	38	23	38	70	53	48	27	47,5	90	69
0	30	21	36	21	37	68	53	47	27,4	49,2	91,5	70,9
6	15	25	40	22	40	67	55	58	30	54	87,1	67,6

8	30	24	39	23	39	70	53	49	25,5	52	93	70,5
1	20	25	40	25	40	70	55	50	30	50,9	90	70
3	10	25	40	22	39	71	53	51	29,5	49	92	69
8	0	26	43	25	36	71	53	48,5	30,5	53,3	90,7	69,9
6	30	20	35	20	36	67	52	47,9	27,3	49,5	91,4	70,8
8	50	21	36	21	37	68	53	49	28	50	82	72
3	25	25	40	22	38	69	53	51	29	51	93	71
6	40	25	39	23	39	71	53	51,8	28	48,9	88,9	68
10	25	25	40	22,5	39	71	53,4	50	28,5	50	90	69
7	2	25	37	23,2 5	37,5	69	53	47	28	52	93,3	70,8
5	70	30	50	25	45	75	55	65	35	60	105	75
3	15	70	60	40	60	90	60	65	40	63	105	80
9	100	24	39	22	37	70	53	49	29	50	92	72
5	10	24	37	22	38	71	54	53	31	53	98	73
7	20	20	38	22	38	70	53	46	27	47	88	67,8
4	5	28	42	28	44	75	60	59	32,6	55	98	72
8	3	22	36	24	38	70	55	49	30	48	90	70
3	50	25	38	22	38	71	53	47	29	52	94	71
5	50	27	40	20	40	69	52	47	32	50	88	70
5	10	23	38	23	39	70	52	48	28	49	92	70
7	80	27	42	24	40	74	55	55	28	51,5	95	71
7	70	24	43	21	39	68	54	46	27	52	96	70
8	12	24	38	23	40	72	54	54	30	49,8	94	69,4
10	2	20	45	25	42	75	55	60	33	56	101	74
7	200	25	38	22	38	68	53	50	28	50	94	71
1	40	25	37	23	38	70	54	47,5	28,7	49	91	69,1
5	30	42	36	20	36	68	52	46	26	47	88	68

4	5	28	42	23	38	72	53	52	28	48	89	68
7	36	21	36	21	37	74	53	48	28	49,5	92	71
5	3	20	35	20	36	70	53	43,1	25	45	95	68
1	20	24	41	23	40	71	53	52	28	49	90	67,6
8	6	27	42	24	40	73	55	58,5	31,8	54,6	97	71,5
7	50	22	36	22	39	70	54	48	28	59	93	71
6	20	25	37	23	38	70	53	54	30	52	94	72
3	20	20	36	21	38	70	52	50	28	50	90	68
7	25	25	41	22	40	70	53	50	28	50	92	71
8	16	24	41	22	39	71	53	53,9	50,1	51,1	93,4	71
7	80	27	39	23	40	73	53	53	29	47	91	68
5	25	25	40	22	39	71	53	53	30	52	95	71
5	10	25	41	25	42	75	55	50	28	48	93	71
5	10	22	40	22	38	70	53	52	30	52	93	71
7	10	25	40	21	37	75	55	55	30	52	101	74
7	25	25	40	23	39	70	55	50	30	50	92	68
7	12	23	36	22	40	69	53	46	27	47	88	68
5	20	26	41	22	38	70	54	54	30	51	90	68
7	6	23	41	23	40	72	53	54	30	52	96	70
1	60	27	38	23	39	70	53	50	31	50	92	72
9	15	21	36	21	38	71	55	50	30	50	90	70
2	1000	22	37	21	38	69	52	46	27	47	88	65
2	50	24	39	23	40	70	53	50	29	50	93	71
6	25	24	40	25	39	71	54	52	30	52	96	70
7	70	20	35	20	36	67	52	43,1	24,7	44,5	82,8	64,4

5	6	24	38	23	38	69	52	47	27	49	90	70
9	25	25	40	22	39	71	53	54	30,3	51,5	95	70,5
7	18	21	37	23	39	68	53	50	29	52	89	68
3	39	21	35	20	38	70	54	50	30	50,3	90,8	69,9
2	50	25	40	23	40	70	55	50	30	59	90	70

- The codes and data are shared as an ipynb and html file.
<https://oguzhanpn.github.io/EC438/>